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ABSTRACT

Costs and cost-related factors connected with providing on-line search services through the public library are examined. The examination was based on preliminary results from an on-going evaluation of an experimental program (DIALIB). In the DIALIB experiment Lockheed's DIALOG search service was available to the public through four public libraries in the San Francisco Bay Area. Preliminary data were gathered on fixed costs connected with system operation, on individual search costs, and on costs associated with the additional time demands made on the library reference staff. In addition, several factors were identified which impinge on the provision of financial support for such on-line search services. (Author/JY)

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FACTORS AFFECTING THE ADOPTION OF ON-LINE SEARCH SERVICES BY THE PUBLIC LIBRARY

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ABSTRACT

This paper examines costs and cost-related factors connected with providing on-line search services through the public library. Preliminary results are presented from an on-going evaluation of an experimental program (DIALIB) underway in Northern California. In this experiment, Lockheed's DIALOG service is available to the public through four libraries in San Mateo and Santa Clara Counties. This paper focuses on fixed costs connected with system operation, on individual search costs, and on costs associated with the additional time demands made on the library reference staff. In addition, several factors are discussed which policy makers should take into consideration when deciding how to provide financial support for on-line search services. The project described in the paper continues through June 1976, at which time generalized results of the experiment will be available.

INTRODUCTION

Although computer on-line search services have been in operation for the past five years, such retrieval systems have not been widely utilized by public libraries. One of the major reasons that public libraries have not used such systems is because they do not have the financial resources necessary to establish a service that has so many unknown implications.

The actual adoption of an on-line search service by the public library will depend on a number of factors. These include the demands the system makes on staff capabilities and time, demands on money resources available to the library, demands on the library administration, and demands on library structure. Costs associated with each of these factors will be discussed in the following sections using preliminary data from an experiment currently being carried out in Northern California.

THE LOCKHEED/CIN PROJECT

Under the sponsorship of the National Science Foundation*, Lockheed is conducting a study to determine whether on-line retrieval services are useful to the general public, and if the public library can be used as a "linking agent" to provide these services. As part of the study, the Lockheed on-line reference retrieval service (DIALOG) (5), is available to the public through four libraries in San Mateo and Santa Clara Counties. DIALOG provides access to sixteen different data bases covering science, engineering, social science, business, agriculture and education. The four libraries participating in the study are all members of the Cooperative

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Information Network (CIN), a cooperative of school, public and corporate libraries that shares information resources. Terminals were installed in the San Mateo County Library, the Santa Clara County Library, the Redwood City Library, and the San Jose Public Library in July 1974. Terminals and staff training are provided at no cost to the participating libraries. In addition, the libraries receive 16 hours per month of free search time and 16 hours per month of free demonstration time for the first year. These libraries are offering searches to patrons at no cost from July 1974 through May 1975. During the second year of the program, beginning in June 1975, the libraries will pay one-half of the actual cost of a DIALOG search. The National Science Foundation will pay the balance. Terminals and demonstration time will still be free. The libraries will pay for the service either through the library budget, user fees, or through some combination of these alternatives. By the third year, terminals and search time will be charged at the full rate and the libraries will be responsible for the total cost of the service.

Evaluation of this experiment is being conducted by Applied Communication Research (ACR), an independent firm. ACR is compiling data concerning system usage patterns, user characteristics, impact of the system on the library reference service, and user and librarian satisfaction with the system. The preliminary data presented in this paper were collected from three different sources. The first source of data is computer command summary statistics provided by Lockheed. These statistics are available for all searches conducted. The second method of data collection is through a "Search Request Form" which is filled out by the patron when a DIALOG search is requested. This form provides information about the type of search requested, the data bases used and information about the patron. Copies of these forms are mailed by the librarians to ACR. Upon receipt of these copies, ACR mails the patron a follow-up questionnaire. This questionnaire deals principally with the patron's satisfaction with the results of the search and with the method used to obtain documents.

MONEY RESOURCES

While the DIALIB project currently provides equipment and staff training at no cost to the libraries, library administrators should be aware of these fixed costs associated with the service. The dial-up terminals currently being used by the libraries cost $85 to $135 per month rental, depending on the features of the terminal selected. Staff training is provided at $50 per day at one of Lockheed's offices (New York, Washington, Los Angeles, Palo Alto) or at $200 per day plus travel at the user's location. Lockheed personnel suggest that one day is sufficient time for adequate basic training.

In addition to these fixed costs, the public library should consider the actual cost of conducting a search. Search costs include telephone connect time, data base access rates, total number of citations printed and staff time. Telephone costs vary depending on the procedure used. Users may direct dial through WATS, FTS, or direct distance dialing. Users may also direct dial from a Tymshare access point for $10.00 per hour. The cost of accessing data bases ranges from $25 per hour to $150 per hour, depending on which data base is used. Table 1 lists data bases, in order of frequency of use by the four participating libraries, and data base access rates. (Note: Since more than one data base can be used in a search, the percentages in Table 1 do not add up to 100%).

TABLE 1

FREQUENCY OF USE OF DIALOG DATA BASES AND ACCESS RATES

DATA BASE	NUMBER OF SEARCHES	PER CENT OF TOTAL	ACCESS RATE
NTIS	208	39.1	$35/hr
ERIC	156	29.3	$25/hr
Psychological Abstracts	154	28.9	$50/hr
Social Science Citations	100	18.8	$70/hr
Engineering Index	75	14.1	$65/hr
INSPEC	60	11.3	$45/hr
Chemical Abstracts	55	10.3	$45/hr
ABI	53	10.0	$65/hr
NAL/CAIN	41	7.7	$25/hr
PANDEX	35	6.6	(no longer available)
CMA/EMA	17	3.2	$90/hr
AIM/APM	4	.8	$25/hr

Tables 2 and 3 present, respectively, the average search time for one question and the average number of citations printed per search (online, offline, and total).

TABLE 2

MEAN SEARCH TIME BY MONTH

	SEPT	OCT	NOV	DEC	JAN	FEB	TOTAL
Mean Search Time	31.28	28.77	30.16	25.05	22.03	19.95	27.66

The results presented in Table 2 indicate that the average search time is approximately 30 minutes. However, search time has been dropping from month to month, and is now more typical of the average search time for DIALOG service in general. Considering that the average cost of accessing a data base is about $30-$40 per hour, this represents an approximate cost of $15-$20 per search for connect time alone. The cost of citations printed offline must be added to this figure.

TABLE 3

MEAN NUMBER OF CITATIONS PRINTED BY MONTH

	SEPT	OCT	NOV	DEC	JAN	FEB	TOTAL
Mean Number of Citations Printed Online	19.20	15.34	16.11	15.46	11.14	17.66	15.31
Mean Number of Citations Printed Offline	11.67	90.53	35.58	25.75	44.53	54.24	47.56
Mean Number of Total Citations	30.87	105.87	51.69	41.21	55.67	71.90	62.87

The average number of offline citations printed out per search is 48. The cost of printing citations offline is 4¢ for titles and 10¢ for titles plus abstracts. Thus, the average search costs an additional $1.92 - $4.80, depending on the number and format of citations requested. The average search may vary, therefore, from $15 - $25 and this figure does not include staff time or fixed expenses.

While the cost of conducting a DIALOG search may appear high, it should be noted that the type of question being asked by DIALOG patrons is not the type of reference question typically answered by public libraries. In a study by Palmour and Gray (4) examining the cost of answering reference questions in Illinois libraries, reference questions were placed in one of four distinct categories. These categories included bibliographic citations, simple fact, multiple fact and complex fact questions. "Simple fact" questions, which represented 66% of all reference questions, were those defined as "requiring a single answer that may be found in one reference tool." "'Multiple fact' questions involve answers compiled from more than one source where the various parts of the answer are brought together for the user....'Complex fact' questions utilize various sources from which conflicting facts and opinions are compiled, compared, and contrasted." The types of questions being asked through DIALOG do not fit easily into any of these categories. In fact, although patrons are currently asking questions on a wide variety of subjects, the majority of questions being answered by DIALOG are highly technical. They include such titles as "Ion Beam Processing", "Aerated Concrete", "Semiconductors", "Extruded Polyvinyl Chloride", and "Auger Spectroscopy." These are not the type of "simple fact" questions that reference librarians typically answer. It is unlikely that patrons would normally bring such technical questions to a public library or that reference librarians, without the aid of on-line searching tools, would be able to provide answers to such questions. Reference librarians cannot be expected to have a working knowledge of a vast number of specialized, technical areas.

The DIALIB experiment indicates that, using DIALOG, reference librarians are providing answers to these types of questions and that these answers are extremely useful to the patrons. Table 4 indicates patron responses to a question dealing with the value of a DIALOG search to the patron.

TABLE 4

VALUE OF SEARCH TO PATRON

VALUE OF SEARCH	PER CENT OF TOTAL RESPONSES
Major Value	19.5
Considerable Value	47.4
Minor Value	26.0
No Value	5.2

The data presented in Table 4 show that almost 70% of the patrons felt that the results of their DIALOG search were of considerable or major value. Table 5 indicates the number of citations that were actually of use to the DIALOG patron.

TABLE 5

NUMBER OF USEFUL CITATIONS

NUMBER OF CITATIONS	PER CENT OF TOTAL
0	17.5
1-5	34.4
6-10	15.6
11-15	5.1
16-20	9.7
21-50	9.5
More than 50	1.2

Also, 48.1% of the DIALOG patrons indicated that the results of the DIALOG search provided sufficient references to answer their question adequately.

STAFF CAPABILITIES AND TIME

In addition to the costs covered in the previous sections, provision of on-line service by the public library involves a number of less obvious costs. These apply particularly to additional demands on the reference staff. The staff time required to conduct a DIALOG search on the terminal is just one aspect of the time demand made on the reference librarian. As mentioned in the previous section, there is an initial period required for training. Training costs include both the actual cost of the training and the cost of removing the librarian from service for the length of time required to attend a training session. Unless the library faces a rapid turnover of personnel, this expense can be considered minimal.

Besides training expenses, DIALOG searches may also require both offline preparation time and time to locate source documents. Table 6 provides offline preparation time broken down by library.

TABLE 6

OFFLINE SEARCH PREPARATION TIME BY LIBRARY

MINUTES	SAN JOSE	CUPERTINO	SAN MATEO	REDWOOD CITY
0	38.5%	15.8%	18.7%	75.2%
5-10	24.6	7.9	27.5	12.6
15-25	27.7	17.5	40.7	9.2
30-35	9.2	22.8	9.9	1.5
40-45	-	10.5	1.1	.4
50-65	-	18.4	1.1	-
70-90	-	7.0	1.1	.8
Mean Time	11.3 min.	32.5 min.	15.9 min.	6.0 min.

Offline search preparation time varies widely between libraries. Redwood City indicates that 75% of their searches require no offline preparation time, whereas San Mateo requires between 15 and 35 minutes of offline

preparation time for 50% of their DIALOG searches. This time is in addition to the average 30 minutes which the librarian spends at the terminal.

Furthermore, DIALOG provides only citations and abstracts. There is then the additional time required to locate pertinent documents cited in the search results. At this point in the experiment, the results indicate that the library conducting the search is not the main supplier of documents. Instead, patrons have turned to a number of other sources to provide the required documents. These sources are listed in Table 7.

TABLE 7

SOURCES THROUGH WHICH DOCUMENTS ARE OBTAINED

SOURCE	PER CENT OF TOTAL
Library at Which DIALOG Search is Made	29.9
Branch Library	9.1
Bookstore	4.5
College Library	20.1
Stanford University Library	8.4
Patent Office	.6
USGS Library	.6
State Game Department	.6
San Mateo County Office of Education	4.5
Company Library	1.3
NTIS	3.2
State Mental Health Department	1.3
San Mateo County Law Library	.6
Government Printing Office	1.3
State Department of Education	.6

The early data also indicate that while most patrons are members of one of the libraries in the CIN network, they are not members of the four libraries conducting the searches. In fact, the data indicate that only 38.3% of DIALOG patrons are members of the four participating libraries. 9.7% of the patrons are not members of any library. Thus, by increasing patronage at the four libraries participating in the experiment, provision of DIALOG service does place an added burden on the staff at these libraries.

LIBRARY ADMINISTRATION

The demand on library administration is less obvious at this time. Any major impact on library administration would depend on the policy the library adopts to cover the cost of the service. If the library decides to include the cost in their current budget and continue to provide free searches, this will have little affect on library administration. However, if the library decides to pass some portion or all of the cost of the service on to the patron, there could be a substantial impact due to the need for a structure capable of dealing with billing and fee collection. This may require both additional staff and additional funds.

Provision of fee-for-service computer searches may also require some rather important policy decisions, as indicated in Firschein and Summit (2). For instance, the library must determine if all patrons will be charged uniformly for the service or if patrons will be charged on a scale based on ability to pay. If the library decides that the user should pay for the service, it must also decide if the patron should only pay for the cost of connect time to the data bases used in the search and for the cost of citations printed offline or if an additional fee should be charged to cover staff time and equipment costs. If the library decides to absorb some portion or the total cost of the service, it may have to do so at the expense of other services. Cooper (1) notes that funding for libraries has remained fairly constant over the years at approximately 1% of total municipal expenditures. It is therefore unlikely that a library will receive additional funds to support on-line services.

Before the library can make a decision about what portion, if any, of the cost should be absorbed by the patron, it would be useful for policy makers to know who the principal users of the system are, the reason these users require DIALOG searches, and the frequency with which DIALOG service would be used.

Again, preliminary results from the DIALIB project can provide the answers to these questions. Table 8 provides a breakdown of DIALOG users by occupation. The two principal classes of users, as indicated by this data, are technical professionals (including civil, nuclear, and electronic engineers, geologists, and computer specialists) and students. The next two major sets of users are individuals in the educational field (including teachers, professors, and school administrators) and librarians.

TABLE 8

OCCUPATION OF DIALOG CLIENTS BY LIBRARY

OCCUPATION	SAN JOSE	CUPERTINO	SAN MATEO	REDWOOD CITY
Technical Professional	9.2 %	34.2 %	5.5 %	14.5 %
College Student	15.4	10.5	4.4	13.7
Graduate Student	12.3	10.5	19.8	9.9
Education	15.4	14.0	16.5	13.4
Librarian	12.3	8.8	8.8	3.1
Business Professional	3.1	5.3	7.7	3.1
Skilled Labor	1.5	-	-	3.1
Scientist or Research	4.6	3.5	9.9	5.0
Social Worker	1.5	.9	2.2	.8
Professional (M.D., Lawyer, Psychologist)	-	-	8.8	8.8
Other	4.5	8.0	14.3	14.6

Further, the data in Table 9 show that the majority of searches are done as part of the patron's job or for a research paper.

TABLE 9

REASON FOR DIALOG SEARCH BY LIBRARY

REASON FOR SEARCH	SAN JOSE	CUPERTINO	SAN MATEO	REDWOOD CITY
Job	26.2	39.5	37.4	31.3
Research Paper	41.5	28.9	30.8	37.0
Personal Interest	9.2	9.6	8.8	9.2
School Assignment	6.2	6.1	6.6	5.3
Business Related	1.5	2.6	5.5	3.8
Advanced Degree	4.6	3.5	5.5	1.1
Book	1.5	1.8	1.1	2.3
Research and Development	0	3.5	2.2	1.9
Teaching	1.5	1.8	0	.4

Finally, Table 10 indicates the average level of education of the DIALOG patron. Over 60% of DIALOG patrons have some graduate work and over 40% have advanced degrees.

TABLE 10

LEVEL OF EDUCATION OF DIALOG CLIENT

LEVEL OF EDUCATION	PER CENT OF TOTAL
Ph.D. or M.D.	14.9
Masters Degree	28.6
Graduate Student	22.7
College Graduate	19.5
College Student	8.4
High School Graduate	1.3
High School Student	1.3

These initial findings suggest that DIALOG clients are not the traditional heavy users of the public library. A study by Paisley and Rees (3) indicates that college graduates are not as regular in public library use as either high school graduates or individuals with only some college. Paisley and Rees also discovered that more women use reference books than men and that use of reference books declines with age. DIALOG users do not fit these characteristics. They tend to be highly educated, 45-65% male, and approximately 50% are between the ages of 30 - 50. Thus, the public library is providing a service to a segment of the population that does not traditionally use their reference service. Table 11 indicates estimated frequency of reference service use by DIALOG clients.

TABLE 11

ESTIMATED FREQUENCY OF REFERENCE SERVICE USE

FREQUENCY	SAN JOSE	CUPERTINO	SAN MATEO	REDWOOD CITY
Daily/Weekly	10.5	-	12.9	9.9
Several Times a Month	15.8	20.0	9.7	14.1
Monthly	15.8	33.3	12.9	16.9
Several Times a Year	47.4	40.0	45.2	39.4
Not at All	-	-	12.9	15.5

The data in Table 11 show that at two of the libraries over 50% of DIALOG patrons normally use the library reference service only several times a year or not at all, and at the other two libraries 40-50% of the patrons are infrequent users.

Finally, Table 12 indicates estimated frequency of future use of DIALOG by patrons who have already used DIALOG.

TABLE 12

ESTIMATED FREQUENCY OF DIALOG USE

FREQUENCY	SAN JOSE	CUPERTINO	SAN MATEO	REDWOOD CITY
Daily/Weekly	10.5	3.3	-	4.2
Several Times a Month	15.8	13.3	-	11.3
Monthly	31.6	16.7	19.4	15.5
Several Times a Year	36.8	60.0	61.3	63.4
Not at All	-	-	12.9	1.4

LIBRARY STRUCTURE

The final factor mentioned in the introduction that might affect the adoption of an on-line search service is the impact on library structure. The DIALIB project is too new to provide any information at this time on what effect DIALOG will have on the structure of the public library. The most obvious point to consider is the possible impact that provision of a fee-for-service operation may have on other services offered through the library. In other words, will there be any additional demands to charge for other services offered to specialized segments of the population? The impact of operating a billing and collection procedure should also be taken into consideration. The DIALIB project should be able to provide some data about changing attitudes towards fee-for-service operations after June, 1975 when the libraries begin charging the patron for conducting an on-line search.

FUTURE EVALUATION PLANS

Evaluation of the DIALIB project will continue through June, 1976, at which time the participating libraries will become responsible for the total cost of providing on-line searches. While each of the libraries is currently averaging about 3-5 hours per week of search time, this is expected to decrease markedly when the client charges begin. It is also expected that the occupational characteristics of DIALOG clients will change at this time, principally through the decreased number of students using the system.

The data being collected will continue to provide information on usage patterns, the impact of DIALOG on the library reference service, user and librarian satisfaction with the system, and the impact of a fee-for-service operation on both the library and the patron. It is expected that generalized results of the experiment will be available by August, 1976.

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